Designation: D1997 – 13

Standard Test Method for Laboratory Determination of the Fiber Content of Peat Samples by Dry Mass[1]

This standard is issued under the fixed designation D1997; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the laboratory determination of the fiber content of peat (as defined in Classification D4427) by dry mass. It also may be used for non-peat organic soil materials.

1.2 Because this test method is simple and requires no sophisticated equipment to perform, it is especially recommended for routine reconnaissance work, where large numbers of samples need to be tested and mineral contents are low.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard. Alternate sieve designations in parentheses are as provided in Specification E11. Use Practice D6026 for determining significant digits to report.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D2974 Test Methods for Moisture, Ash, and Organic Matter of Peat and Other Organic Soils

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4427 Classification of Peat Samples by Laboratory Testing

D6026 Practice for Using Significant Digits in Geotechnical Data

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 *Definitions:*

3.1.1 For common definitions of terms in this standard, refer to Terminology D653.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *fiber*—a fragment or piece of plant tissue that retains a recognizable cellular structure and is large enough to be retained on a 150-µm (No. 100) sieve. Plant materials larger than 20 mm in smallest dimension are not considered fibers.

4. Summary of Test Method[3]

4.1 A known mass of intact, undried peat is soaked in a dispersing agent (5 % sodium hexametaphosphate) for approximately 15 h. The material is then washed through a 150-µm (No. 100) sieve (see Specification E11) by application of a gentle flow of tap water. The fibrous material left on the sieve is oven-dried (at 110 ± 5°C) until the mass does not change more than 0.1 % per hour. The mass of fiber is expressed as a percentage of the oven-dried mass of the original sample.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

5. Significance and Use

5.1 The purpose of this test method is to standardize the procedure for determining fiber content of peat by dry mass.

5.2 A standard test method for determining the quantity of fibers in a peat sample is necessary not only for classifying peats and organic soils (as in Classification D4427), but is also a significant parameter in predicting or defining the many end

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.22 on Soil as a Medium for Plant Growth.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] This test method is a modified version of one described in: Riley, J. L., "Laboratory Methods for Testing Peat," *Ontario Peatland Inventory Project*, Ontario Geological Survey Open File Report 5572, 1986, pp. 21–22.

***A Summary of Changes section appears at the end of this standard**

uses of these materials. In this regard, fiber content has been related to agricultural and horticultural end uses (such as mulching, soil enrichment, etc.), geotechnical measurements (such as strength, compressibility, permeability, etc.), industrial chemical uses (such as production of waxes, activated carbon, medicines, etc.), and even energy uses (such as direct combustion, methanol production, gas yields, etc.).

6. Apparatus

6.1 *Sieve,* 150-µm (No. 100) (in compliance with Specification E11).

6.2 *Drying Oven,* capable of being set at 110°C ± 5°C.

6.3 *Balance,* capable of measuring at least to the nearest milligram.

6.4 *Standard Laboratory Stirrer,* capable of being set to 240 r/min.

6.5 *Beaker,* 1000-mL capacity.

6.6 *Funnel.*

6.7 *Hydrochloric Acid (HCl) Tank or Pan.*

6.8 *Filter Paper.*

7. Reagents

7.1 *Sodium Hexametaphosphate,* 5 % solution reagent grade.

7.2 *Hydrochloric Acid (HCl),* 2 % solution reagent grade.

8. Procedure

8.1 Select a representative sample of undried peat and determine its moisture content in accordance with Test Methods D2974.

8.2 Separate out a specimen of approximately 100 g and record its mass, *M*.

8.3 Place this specimen in the beaker and add approximately 500 mL of 5 % sodium hexametaphosphate solution (dispersing agent). Stir thoroughly and let stand for at least 15 h.

8.4 After the specimen has stood 15 h, stir it thoroughly using a laboratory stirrer at 240 r/min for 10 min. Avoid higher speeds or longer stirring periods.

8.5 Pour over a 150-µm (No. 100) sieve (or piece of sieve screen) held over a sink or other suitable container for disposal.

8.6 Wash the specimen on the screen using a rubber hose attached to a water faucet. Avoid a jet of high pressure water that would tend to force the fiber through the screen or splash it out over the top of the sieve. Wash until water passing through the screen is clear.

8.7 Place the sieve with the specimen into a shallow tank or pan containing a 2 % solution of HCl for at least 10 min (to dissolve any carbonates that may be present).

8.8 Wash again with water to remove residual HCl (approximately 5 min). Dispose waste solution containing HCl safely.

8.9 Remove from the screen any large mineral grains and also any large (greater than 20 mm) pieces of plant material such as roots or wood.

8.10 Invert screen over a large funnel containing a piece of filter paper of known mass to the nearest milligram (#4 or equivalent). Wash all of the fibers off the screen into the funnel from the back of the screen to dislodge any fibers stuck to the screen.

8.11 After the water has drained through the funnel, remove the filter paper containing the fibers and dry in a drying oven set at 110 ± 5°C until the mass does not change more than 0.1 % per hour.

8.12 Record the mass of the dried sample to the nearest milligram. This mass minus the mass of the filter paper is the mass of the fibers. Record this mass as M_f.

8.13 It may be necessary to ash the specimen in accordance with Test Methods D2974 to separate the mineral content. Rewash the residue after ashing and record the mass in milligrams. Then subtract this mass from M_f in order to obtain a true mass of fibers.

9. Calculation

9.1 The initial mass of dry specimen $M_s = (100 - w)M$ if moisture content is expressed as a percent of the as-received mass. The initial mass of the dry specimen $M_s = [M/(w + 100)] \times 100$, if the moisture content is expressed as a percent of the oven dry mass.

9.2 Fiber content, $\% = M_f/M_s \times 100$

where:

M_f = dry mass of specimen after washing (from 8.12 or 8.13), mg,
M_s = initial dry mass of specimen, mg,
M = initial total mass of specimen, mg, and
w = % water as determined in Test Methods D2974.

10. Report: Test Data Sheet(s)/Form(s)

10.1 Record as a minimum the following general information:

10.1.1 Sample/specimen identifying information, such as Project No., Boring No., Sample No., Depth, etc.

10.1.2 Any special selection and preparation process, such as removal of gravel or other materials.

10.1.3 Technician name, method used, and date.

10.1.4 Note whether ashing was necessary to account for mineral content.

10.2 Record as a minimum the following test information:

10.2.1 Results for percent fiber content, water content and ash content, to the nearest 0.1 %. Use Practice D6026 to determine significant digits.

10.2.2 Furnace temperature used for ash content determinations.

11. Precision and Bias

11.1 *Precision*—Test data on precision is not presented due to the nature of the soil materials tested by this test method. It is either not feasible or too costly at this time to have ten or more laboratories participate in a round-robin testing program.

11.1.1 The Subcommittee D18.22 is seeking any data from the users of this test method that might be used to make a limited statement on precision.

11.2 *Bias*—There is no accepted reference value for this test method, therefore, bias cannot be determined.

12. Keywords

12.1 ash; fiber content; organic soil; peat

SUMMARY OF CHANGES

Committee D18 has identified the location of selected changes to this standard since the last issue (D1997 – 91 (2008)$^{\varepsilon 1}$) that may impact the use of this standard. (Approved June 1, 2013.)

(1) Revised Sections 1, 2, 4, 5, 6, 8, 9, and 12.
(2) Updated term 3.2.1.
(3) Added Section 10.
(4) Added Note 1 and 11.2.